



Sullivan
PATENT 10/13/00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

J. Krom, et al.

For:

**REACTION PRODUCT DERIVED
FROM AMINE-FUNCTIONALIZED
ELASTOMERS AND MALEATED
POLYOLEFINS**

Serial No.:

09/097,035

Filed:

June 12, 1998

Examiner:

D.R. Wilson

Art Unit:

1713

Last Office Action:

June 16, 2000

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APPEAL BRIEF UNDER 37 C.F.R. §1.192

ATTENTION: Board of Patent Appeals and Interfaces
Assistant Commissioner for Patents
Washington, DC 20231

Dear Sir:

This appeal brief (submitted in triplicate) relates to the above-identified application, wherein claims 1-4, 6-10, 13, 14, and 21 were finally rejected in the Office Action of June 16, 2000. A Notice of Appeal was filed in this application on October 2, 2000.

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I. REAL PARTY IN INTEREST (37 C.F.R. §1.192(c)(1))

The real parties in interest in this appeal are the inventors named in the caption of this brief (James A. Krom, et. al.) and their assignee, Bridgestone/Firestone, Inc.

II. RELATED APPEALS AND INTERFERENCES (37 C.F.R. §1.192(c)(2))

There are no other appeals or interferences currently in process or pending before the U.S. Patent and Trademark Office that will directly affect, or will be directly affected by, or will have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS (37 C.F.R. §1.192(c)(3))

The status of the claims set forth after the Final Office Action mailed June 16, 2000 is as follows:

Allowed Claims:	None
Rejected Claims:	1-4, 6-10, 13, 14, and 21
Withdrawn Claims:	5, 11-12, and 22.

IV. STATUS OF THE AMENDMENTS (37 C.F.R. §1.192(c)(4))

In the final Office Action of June 16, 2000, the Examiner rejected claims 1 and 22 under 35 U.S.C. §132 for containing new matter. Claims 1-4, 6, 13-14, and 21 were rejected under 35 U.S.C. §112, First Paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1-4, 6-10, 13-14, and 21-22 were rejected

under 35 U.S.C. §112, Second Paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-4, 6-10, 13-14, and 21-22 were rejected under 35 U.S.C. §102(b) as being anticipated by Coran. Claims 1-4, 6-10, 13-14, and 21-22 were rejected under 35 U.S.C. 103(a), as being unpatentable over Berta in view of Stayer, Jr. and Admissions by Applicant.

Subsequent to the Final Office Action, Applicants filed an amendment on August 16, 2000. This amendment requested the cancellation, without prejudice of claims 5, 11, and 12. It further sought to overcome the Examiner's rejections to all claims. The Examiner issued an Advisory Action dated August 30, 2000, informing Applicants that the response to the Final Action would not be entered.

Subsequent to the Advisory Action of August 30, 2000, Applicants filed an amendment simultaneously with a Notice of Appeal and a Request for Extension of Time dated October 2, 2000. The Examiner issued an Advisory Action dated October 16, 2000, informing Appellants that the response to the Final Action would not be entered.

Subsequent to the Advisory Action of October 16, 2000, Applicants filed an amendment dated October 30, 2000. This amendment sought to overcome the outstanding objections to new matter, and rejections under 35 U.S.C. §112, first and second paragraph, as well as cancellation of claim 22. The Examiner issued an Advisory Action dated November 20, 2000, informing Appellants that the response to the Final Action would be entered. The Examiner noted that this amendment, once entered, would overcome the outstanding objections to new matter, and rejections under 35 U.S.C. §112, first and second paragraph.

In addition, in the Advisory Action dated November 20, 2000, the Examiner noted that Appellants did not repeat the cancellation of withdrawn Claims 5, 11, and 12. Therefore, an Amendment is being filed simultaneously to the filing of the subject Appeal Brief to correct this oversight. The Examiner has noted that such an amendment will be entered.

The amendments being entered by the Examiner after final are reflected in the appended claims.

V. SUMMARY OF THE INVENTION (37 C.F.R. §1.92(c)(5))

The claims on appeal are directed toward a composition comprising the reaction product of a first and second polymer (claim 1, specification p. 2, lines 7-9). More specifically, the first polymer includes a polyolefin with at least one pendant or terminal functional group such as a carboxylic acid or acid anhydride. The second polymer is a copolymer of conjugated diene units or a copolymer of conjugated diene units and vinyl aromatic units with at least one nitrogen containing terminal group.

Claim 2 is directed to the reaction product of claim 1 wherein the carboxylic acid of said anhydride is derived from maleic acid or maleic anhydride. Support for this claim may be found in the specification on page 4, lines 8-10, which states, "Maleic anhydride or another olefinic carboxyl containing monomer (as described above) having at least one carbon to carbon double bond (unsaturated) is added to the mixture." Further support for claim 2 may be found on page 3, lines 10-13 of the specification, which states, "Polymers, e.g., polyolefins, can be prepared with carboxyl

groups such as succinate or succinic anhydride groups (derived from maleic anhydride) by a variety of methods.”

Claim 3 further defines the first polymer of claim 1 as a thermoplastic polymer. Support for this claim may be found on page 3, lines 23-24 of the specification, which states, “In a preferred embodiment the polyolefin is a thermoplastic which can result in a thermoplastic elastomer...”

Support for claim 4, which defines the first polymer as a poly(olefin) comprised of at least 80 weight percent α -olefin may be found in the specification on page 4, lines 21-23, which states, “Desirably, the polyolefin has at least 80 weight percent repeat units from the polymerization of at least one α -monoolefin monomer...”

Claim 6 defines the α -olefin of claim 4 as comprising polypropylene. Support for this claim may be found on page 4, lines 21-25 of the specification, which states that the desired polyolefin is at least 80 weight percent of “...either ethylene or propylene.”

Support for claim 7, which defines the second polymer of claim 1 as comprising butadiene units may be found in the specification on page 5, lines 22-23, which states, “A preferred group of polymers is a polymer polymerized from at least one conjugated diene...”

Claim 8 further defines the second polymer of claim 1 as having at least 40 weight percent comprised of conjugated diene units. This claim is supported by page 5, lines 26-28, which states, “...the polymers made from conjugated dienes comprise at least 40 weight percent repeat units from at least one conjugated diene...”

Claim 9 further defines the polymer of claim 7 as comprising at least about 40 weight percent butadiene units. Support from this claim may be found on page 5, lines 26-28 of the specification (quoted above).

Claim 10 is directed to a composition according to claim 1 (page 2, lines 7-9), wherein at least 80 weight percent of the first polymer (page 4, lines 21-23) is derived from the polymerization of propylene and/or ethylene (page 4, lines 21-25), and the at least one carboxylic acid or the at least one anhydride of the first polymer is derived from maleic acid or maleic anhydride (page 4, lines 8-10, and page 3, lines 10-13), and at least 50 weight percent of the second polymer (page 5, line 25) is comprised of the polymer of conjugated diene units.

Claim 13 defines the second polymer of claim 1 as an elastomer. This is supported on page 2, lines 31-33, which states, "... elastomers from at least one conjugated diene...are preferred for the second polymer."

Claim 14 requires the terminal nitrogen group of claim 1 be derived from *N*-butylidenebenzylamine. This claim is supported on page 1, line 33- page 2, line 1 of the specification, which states, "Imine compounds such as *N*-butylidenebenzylamine can be used to functionalize and terminate living anionic polymers.

Finally, claim 21 is directed to a composition comprising the reaction product of a maleated polypropylene and an amine terminated polybutadiene. This claim is supported by page 2, lines 16-25 of the specification, as well as page 4, lines 21-25.

VI. ISSUES (37 C.F.R. §1.192(c)(6)

1. Whether claims 1-4, 6-10, 13-14, and 21 were properly rejected under 35 U.S.C. §102(b), as being anticipated by Coran (U.S. Patent No. 4,409,365).

2. Whether claims 1-4, 6-10, 13-14, and 21 were properly rejected under 35 U.S.C. §103(a), as being unpatentable over Berta (U.S. Patent No. 5,962,573) in view of Stayer, et. al. (5,066,729), and Admissions by Applicants.

VII. GROUPING OF CLAIMS (37 C.F.R. §1.192(c)(7)

Appellants contend that all of the claims do not stand or fall together. Particularly, claims 1-4, 6-7, and 13-14 claim a reaction product of a first and second polymer. Claims 8-10 define a particular butadiene content of the butadiene-vinyl aromatic second polymer. Claim 21 claims a composition comprising the reaction product of a maleated polypropylene and amine terminated polybutadiene. Accordingly, Appellants submit for the reasons articulated in the Arguments section that claims 1-4, 6-7; claims 8-10; and claim 21 require separate consideration. This is explained in detail below.

VIII. ARGUMENTS

Issue 1

Appellants maintain that claims 1-4, 6-10, 13-14, and 21 are improperly rejected under 35 U.S.C. §102(b) as being anticipated by Coran (U.S. Patent No. 4,409,365).

Claim 1 of the present invention claims a reaction product of a first and second polymer. Specifically, the first polymer comprises a poly(olefin) which includes at least one pendant or terminal functional group comprised of a carboxylic acid or an anhydride of carboxylic acid or combinations thereof. The second polymer comprises a copolymer substantially of conjugated diene units or a copolymer substantially of conjugated diene units and vinyl aromatic units, and further includes at least one nitrogen containing terminal group.

The Examiner contends that Coran discloses and claims compositions which anticipate the instant claims. The Examiner states, "Acrylonitrile rubbers with 80 wt.% of butadiene would be immediately envisioned because Coran teaches that they include butadiene copolymers with as little as 20 wt.% of acrylonitrile (col. 2, lines 49-52). Although Coran is not directed to the elected species of the amine-terminated second polymer, it is included because it anticipates claims under consideration."

As recognized by the Examiner, Coran is divergent conceptionally from the present invention, i.e., "Coran is not directed to the elected species." More importantly, Coran does not teach or suggest the presently claimed composition. Moreover, Coran is directed to a mixture of (a) crystalline polyolefin resin and vulcanized monoolefin rubber and (b) crystalline polyolefin resin and vulcanized nitrile rubber. The Examiner focuses on the (b) component of the Coran mixture as allegedly anticipating the invention. However, the present invention requires the second polymer be substantially conjugated diene units or substantially conjugated diene and vinyl aromatic units. Each excludes the Coran greater than 20% nitrile rubber requirement. This divergence is shown in the present specification wherein 100% butadiene polymers

or 100% butadiene/styrene copolymers are taught and exemplified. In short, a 20-50% acrylonitrile copolymer (i.e. nitrile rubber) cannot anticipate the claimed substantially conjugated diene or substantially conjugated diene/vinyl aromatic copolymers.

Appellants' claims exclude a 20% nitrile containing copolymer.

Claims 8-10 are directed to copolymers comprised substantially of conjugated diene units and vinyl aromatic units, and further including at least one nitrogen containing terminal group. In each of these claims, the second polymer comprises at least 40 weight conjugated diene units (claims 8 and 9) or at least 50 weight percent conjugated diene units (claim 10). The remaining 50-60 weight percent of the second polymer is substantially vinyl aromatic units, as defined in claim 1, to which these claims each refer. Due to the fact that each of these claims is ultimately dependant from claim 1, each one excludes the Coran greater than 20% nitrile rubber requirement for the same reasons explained above. Moreover, a 20-50% acrylonitrile copolymer (i.e. nitrile rubber) cannot anticipate claims 8-10 as suggested by the Examiner.

In addition, claim 21 is directed to a composition comprising the reaction product of a maleated polypropylene and amine terminated polybutadiene. Accordingly, claim 21 does not encompass nitrile rubber. Moreover, polybutadiene is not equivalent to the rubbery polymers of 1,3-butadiene or isoprene and acrylonitrile of Coran. More particularly, the present reaction product claim language of the present invention does not encompass a 20% acrylonitrile polymer.

Furthermore, with respect to all claims, the Coran patent teaches a mixture of the two compositions described above. In fact, the examples of Coran simply mix the four components of the system together (see column 4, lines 19-23). The Coran patent

does not teach reacting the rubbery polymer with the polyolefin resin. In contrast, the present invention is directed to a reaction product of a first and second polymer (as seen in claims 1 and 21). This is a significant divergence from the Coran teaching. A reaction product, as claimed in the present invention, requires covalent or ionic bonds be formed between the various components in a mixture. The Coran patent teaches a mixture of four different components, not the chemical bonding between the two specific components claimed by Appellants. The Coran teaching cannot be concluded to be a reaction product of two of the four mixed components (i.e., nitrile rubber, amine-nitrile rubber, polypropylene and MA-modified polypropylene).

Importantly, there is also no suggestion in Coran to substitute a substantially butadiene polymer for the required vulcanized nitrile rubber at 20% or more acrylonitrile. Furthermore, in the Coran patent, the nitrile rubber functions solely as a compatibilizer, whereas in the present invention the amine functionalized polybutadiene is a primary reactant. To further support this position, it should be noted that the Coran patent teaches the use of the amine terminated nitrile rubber as a compatibilizer in amounts less than 10 pbw (column 3, table 1). The present invention incorporates amine terminated polybutadiene as a major component in the reaction product.

Thus, Appellants submit that Coran does not anticipate or suggest any of the pending claims.

Issue 2

Appellants maintain that claims 1-4, 6-10, 13-14, and 21 are improperly rejected under 35 U.S.C. §103(a) as being unpatentable over Berta (U.S. Patent No.

5,962,573) in view of Stayer, Jr. (U.S. Patent No. 5,066,729) and Admissions by Applicant.

Claim 1 of the present invention is directed to the reaction product of a first and second polymer. The Examiner asserts, in the Office Action mailed December 30, 1999, "...it would have been obvious to one of ordinary skill in the art to use an amine-terminated polybutadiene with the expectation of achieving a polypropylene grafted polybutadiene which is equivalent for the intended purpose to that prepared from the hydroxy terminated polybutadiene [of Berta]....It would have been obvious to use the amine terminated polybutadienes taught by Stayer, Jr., because they are among the known ones.

Appellants assert that the present invention would not have been obvious as stated by the Examiner. Berta teaches a four-part composition (and as much as a six-component system) consisting of (1) a thermoplastic olefin, (2) an anhydride-grafted thermoplastic polyolefin, (3) an oxidized polyethylene wax, and (4) a functionalized polymer that is reactive with the anhydride groups of the anhydride-grafted polymer.

The Examiner contends that a simple substitution of an amine functionalized butadiene (as in Stayer) for the Berta functionalized polymer (e.g. hydroxy-terminated butadiene) is all that is necessary to achieve the present invention. First, this ignores the fact that Berta is at least a four component system, not likely to suggest a reaction product of two components. Second, this ignores the fact that hydroxy-terminated butadiene is only one of seven alternatives in the Berta teachings (column 1, line 65-column 2, line 24). In this regard, the skilled artisan is faced with considering all possible substituents for each of the seven potential functionalized

polymers of Berta. The resultant number of possibilities is countless. This daunting task would not lead to Appellants' claimed invention absent prohibited hindsight. Moreover, no motivation to specifically select the hydroxy-terminated polybutadiene as the functionalized polymer to modify exists. Furthermore, other than the hindsight of the present invention and the convenience of the Stayer reference, no motivation exists to link the amine-terminated olefin/alkylene oxide copolymer with the polybutadiene as a teaching on amine functionality. Add to this level of unguided selection to reach the present invention, the fact that the functionalized polymer is only 2 to 8 parts per hundred of the thermoplastic olefin, it is clear the present reaction product is not prima facie obvious in view of Berta/Stayer as contended by the Examiner.

Furthermore, the present invention claims the reaction product of a first polymer and a second polymer. As can be seen in Claim 1, the first polymer is a poly(olefin), including at least one pendant or terminal functional group and the second polymer includes conjugated diene units or a copolymer including conjugated diene units and vinyl aromatic units. The second polymer further includes at least one nitrogen containing terminated group. In the Berta patent, the functionalized polymer serves only as a minor constituent, not as a primary reaction component as in the present invention. Accordingly, no basis exists to conclude that Berta teaches or suggests a reaction product of a MA-polyolefin and amine terminated butadiene.

Finally, although Berta supposes the functionalized polymer reacts with the anhydride-grafted polymer, this supposition is not borne out in the examples. In fact, the opposite is true. As demonstrated by comparative examples 13, 14, 16, and 17 of the Berta patent, adducts of a functionalized polymer (amine-terminated polyethylene oxide,

ATPEO) with an anhydride-grafted polyolefin (maleic anhydride-grafted ethylene/propylene copolymer) are actually detrimental to the properties of the composition. Berta teaches in comparative examples 12 and 15, the criticality of the presence of the oxidized polyethylene wax. To further support the Appellants contention, it should be noted that oxidized polyethylene wax contains oxygen functional groups which are capable of reacting, or interacting, by polar forces, with anhydride-grafted polyolefins. Furthermore, the quantity of the oxidized wax is greater than the quantity of the functionalized polymer in the preferred embodiments of the Berta patent.

The results of Berta's examples support Appellants' position that the anhydride-grafted polymer interacts with the oxidized wax. Conversely, Appellants provide clear evidence, by means of an extraction experiment, of an interaction between the functionalized polybutadiene and the maleic anhydride-grafted polypropylene, and of consequent improvements in the tensile properties of the composition. It should be noted that the ability of the oxidized wax to react with the maleic anhydride-grafted polypropylene would have a detrimental effect on the present composition. Therefore it would not be beneficial to include an oxidized polyethylene wax in the present invention as suggested by the Examiner.

Claim 21 claims a composition comprising the reaction product of a maleated polypropylene and amine terminated polybutadiene. The above arguments traversing the Examiner's contentions regarding claim 1 are equally applicable to the Examiner's contentions regarding claim 21. However, it should be noted that an even higher level of distinctiveness is provided in claim 21. In this claim, maleated polypropylene and amine terminated polybutadiene are specified as the reaction



components of the present invention. Given this level of polymer specificity, the unobviousness of the claimed invention is clear. Moreover, an overwhelming selection task is required from the general Berta list of seven possibilities (all of which would requiring further modification) to reach the claimed invention. There is no teaching or suggestion found in Berta to suggest Appellants superior combination of maleated polypropylene and an amine terminated polybutadiene. The conclusion by the Examiner is possible only through prohibited hindsight using the present invention as a road map.

Consequently, Appellants contend that other than through prohibited hindsight it would not be obvious to use the amine-terminated polybutadienes, as taught in Stayer, in combination with MA-grafted polypropylene.

IX. CONCLUSION

Appellants submit that claims 1-4, 6-10, 13-14, and 21 are not anticipated/obvious as concluded by the Examiner. Accordingly, Appellants respectfully request the Board to reverse the final rejection of all claims.

Respectfully Submitted,

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CERTIFICATE OF MAILING

I hereby certify that this **AMENDMENT** is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231 on December 4, 2000.

Georgeen B. George

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APPENDIX

1. A composition comprising the reaction product of:
 - a. a first polymer comprising a poly(olefin), the polymer including at least one pendant or terminal functional group comprised of a carboxylic acid or an anhydride of carboxylic acid or combinations thereof, and
 - b. a second polymer comprised substantially of a copolymer of conjugated diene units or a copolymer comprised substantially of conjugated diene units and vinyl aromatic units, and further including at least one nitrogen containing terminal group.
2. A reaction product according to claim 1, wherein said carboxylic acid or said anhydride is derived from maleic acid or maleic anhydride.
3. A composition according to claim 1, wherein said first polymer is a thermoplastic polymer.
4. A composition according to claim 2, wherein said first polymer is a poly(olefin) comprised of at least 80 weight percent α -olefin.
6. A composition according to claim 4, wherein said α -olefin comprises propylene.
7. A composition according to claim 1, wherein said second polymer comprises butadiene units.
8. A composition according to claim 1, wherein at least 40 weight percent of said second polymer comprised of conjugated diene units.
9. A composition according to claim 7 wherein said butadiene units comprise at least 40 weight percent of said second polymer.

10. A composition according to claim 1, wherein at least 80 weight percent of the first polymer is derived from the polymerization of propylene and/or ethylene, and said at least one carboxylic acid or said at least one anhydride of said first polymer is derived from maleic acid or maleic anhydride, and
at least 50 weight percent of said second polymer is comprised of said polymer of conjugated diene units.

13. A composition according to claim 1, wherein said second polymer is an elastomer.

14. A composition according to claim 1, wherein said terminal nitrogen containing group is derived from *N*-butylidenebenzylamine.

21. A composition comprising the reaction product of a maleated polypropylene and amine terminated polybutadiene.